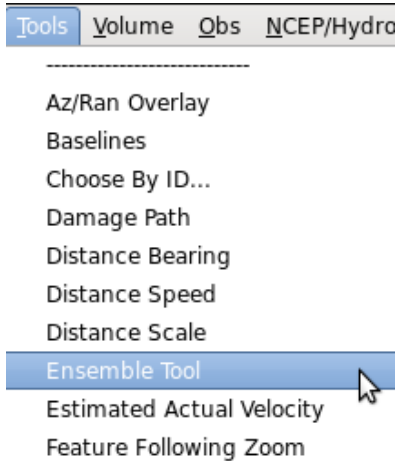


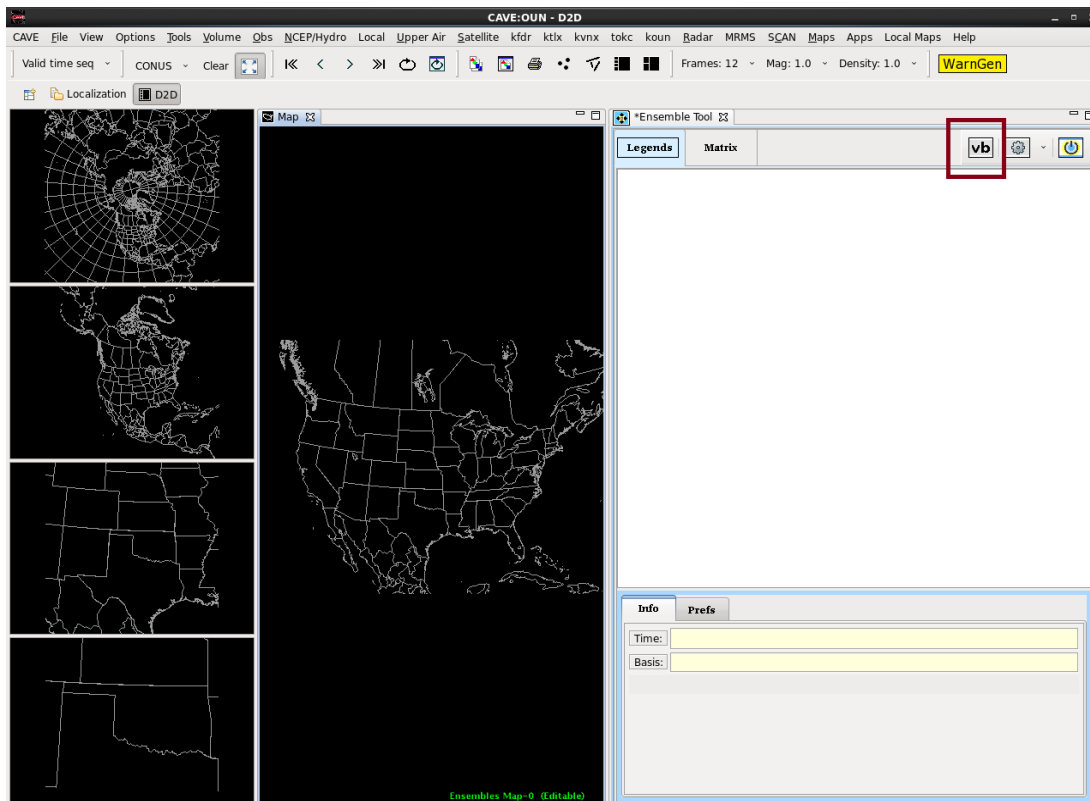
## Ensemble Tool Jobsheet

**Summary:** In this example we will load the GEFS data and create the following plots from all the ensemble members: maximum precipitation plot, minimum precipitation plot, relative frequency plot, sampling display, and the histogram sampling display.

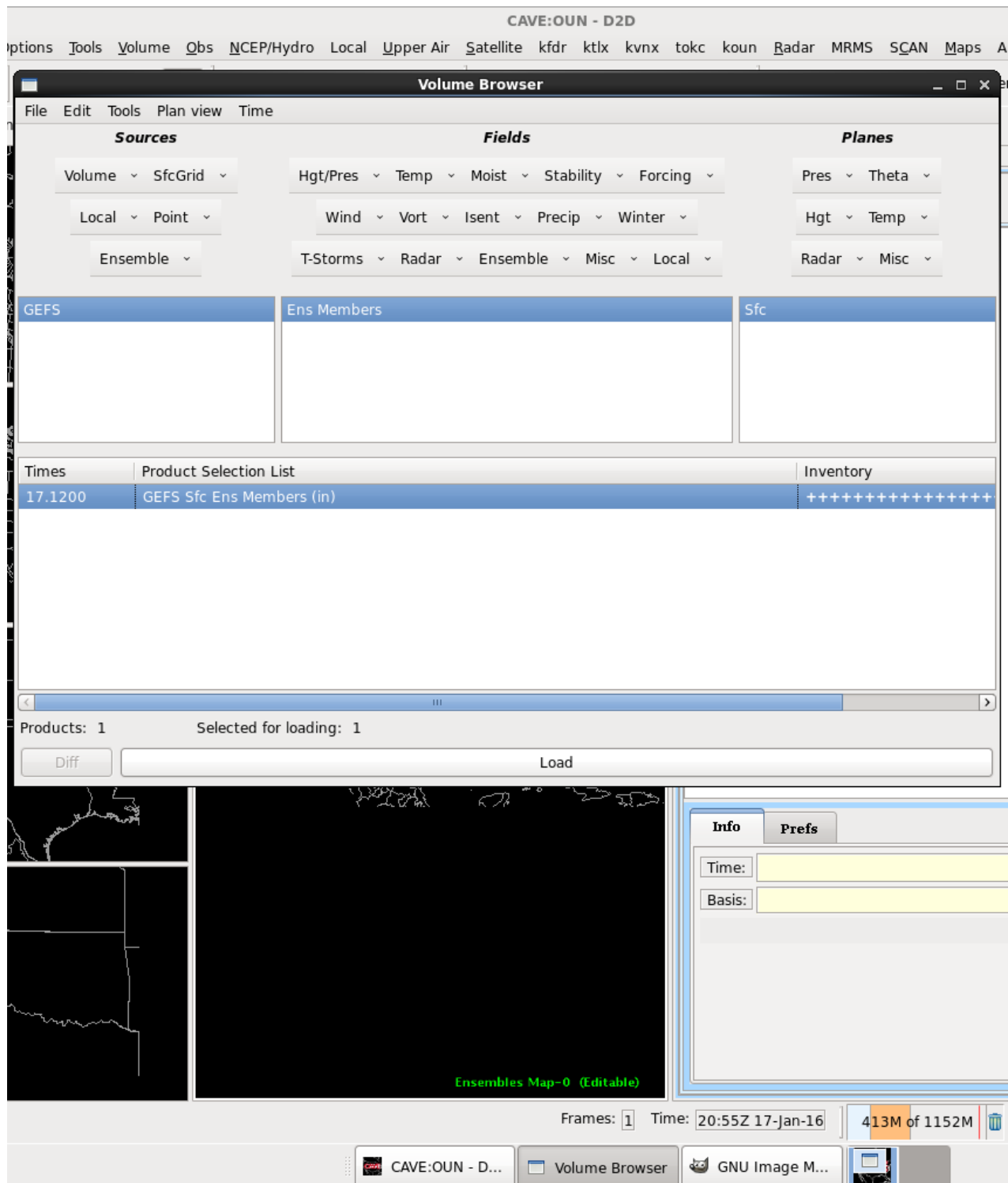
1. On **CONUS** scale, load the **Ensemble Tool** from the **Tools** menu.

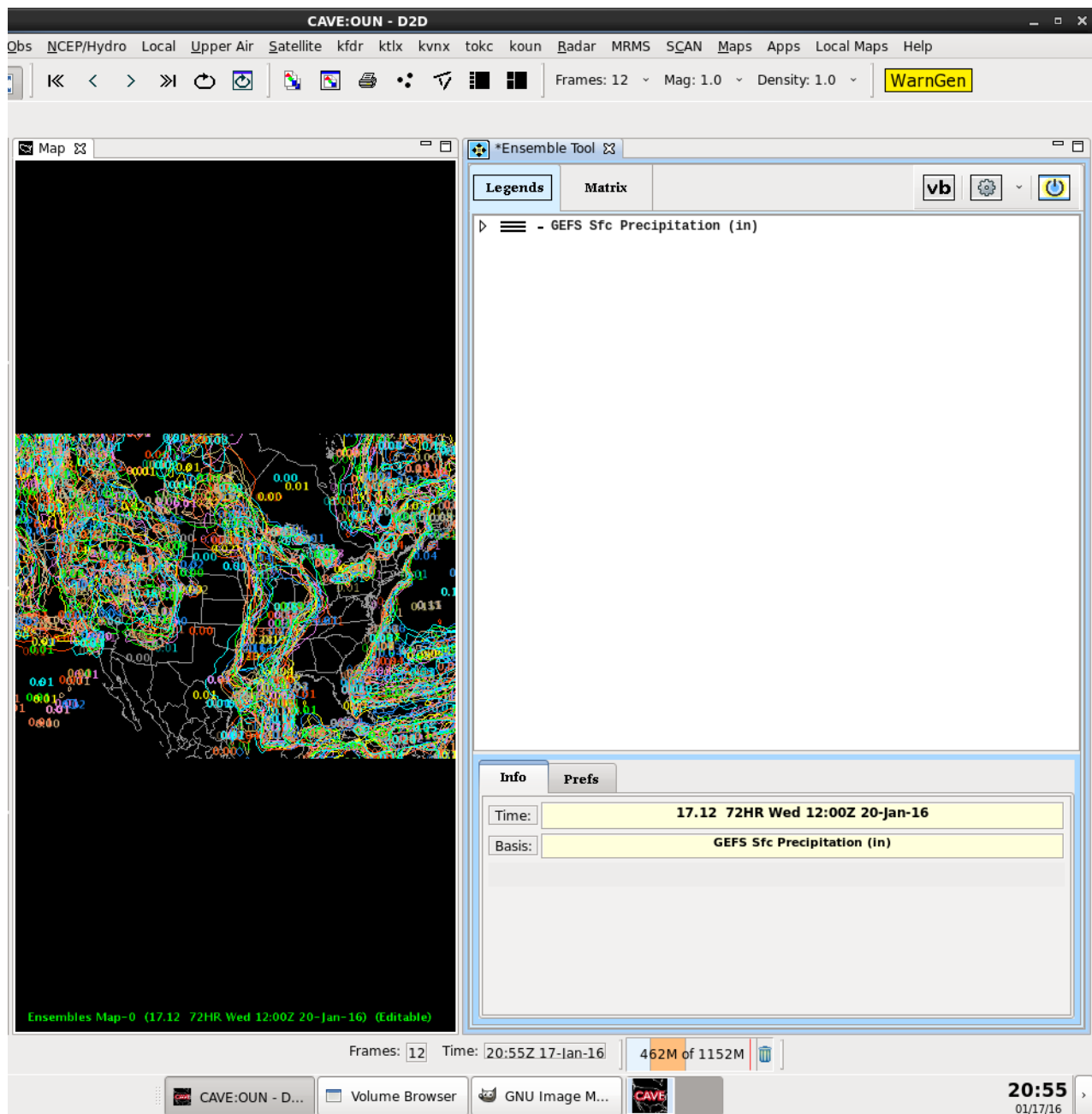


2. Click on the **vb** button in the upper right part of the Ensemble Tool tab.

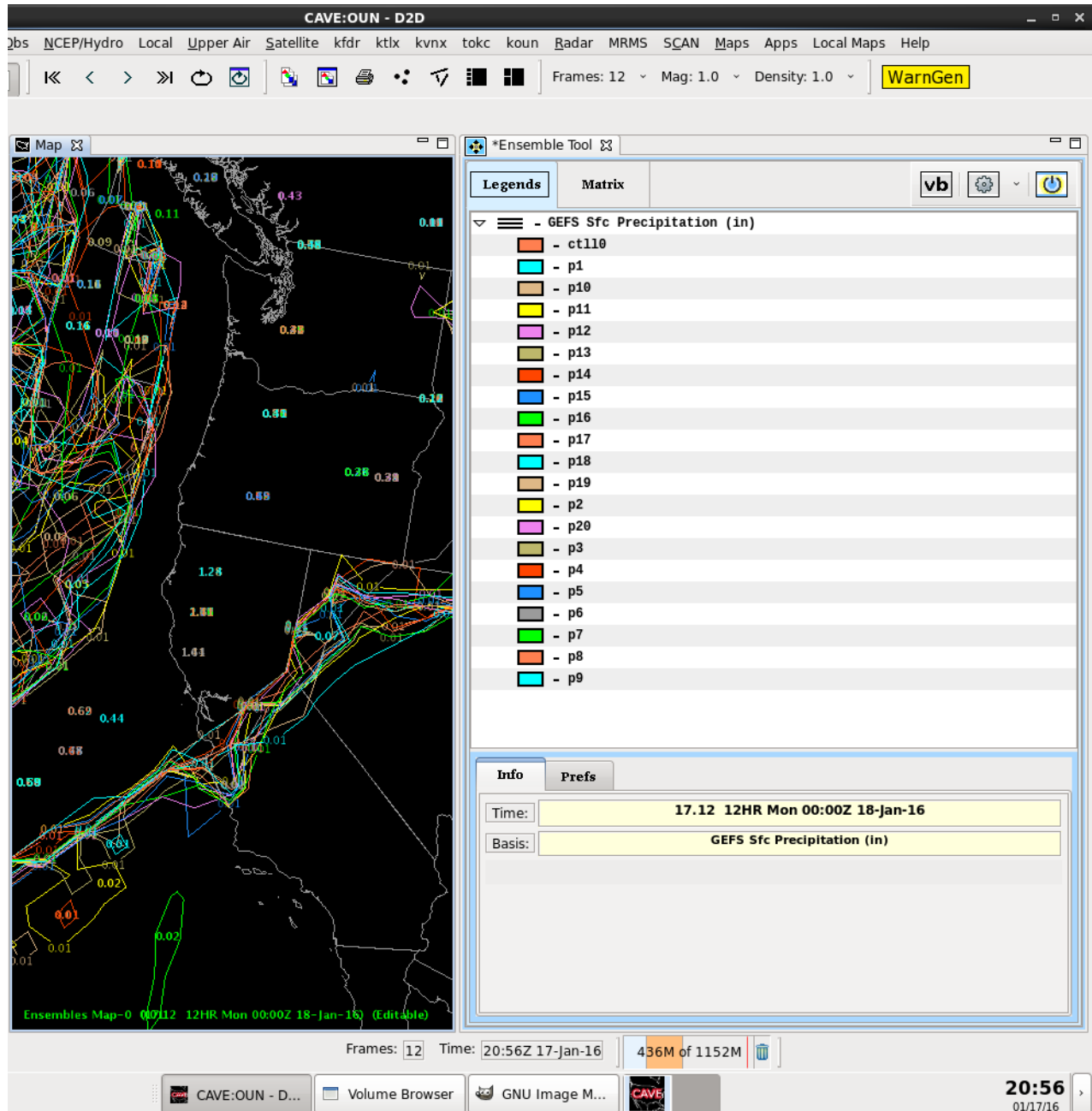


3. Load the **GEFS surface precip ensemble members** from the Volume Browser.
  - a. Source->Ensemble->GEFS, Fields->Ensemble->GFS Ensembles->Precip->Ens Members, Planes->Misc-Sfc (note your VB menus can be slightly different)

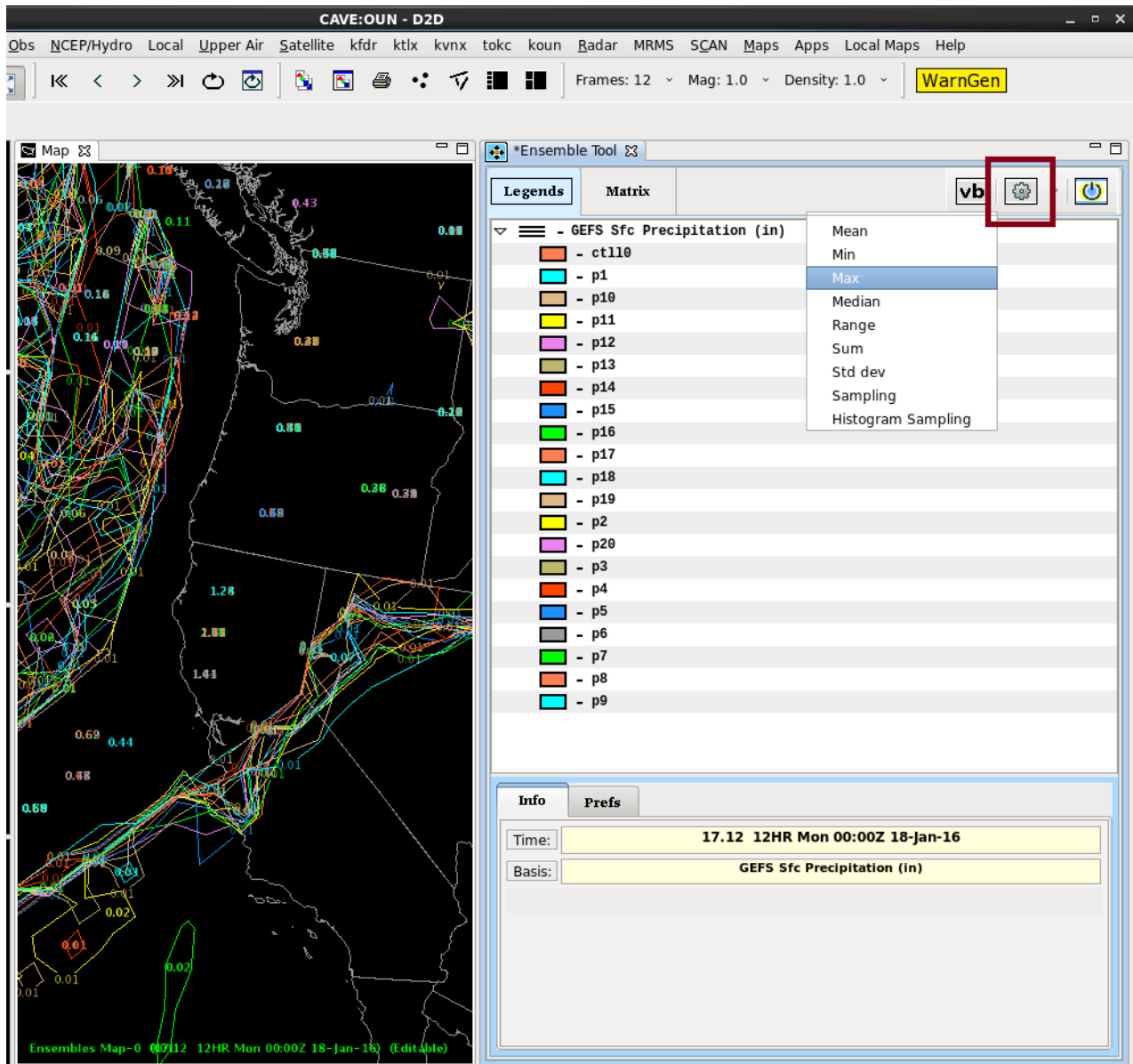


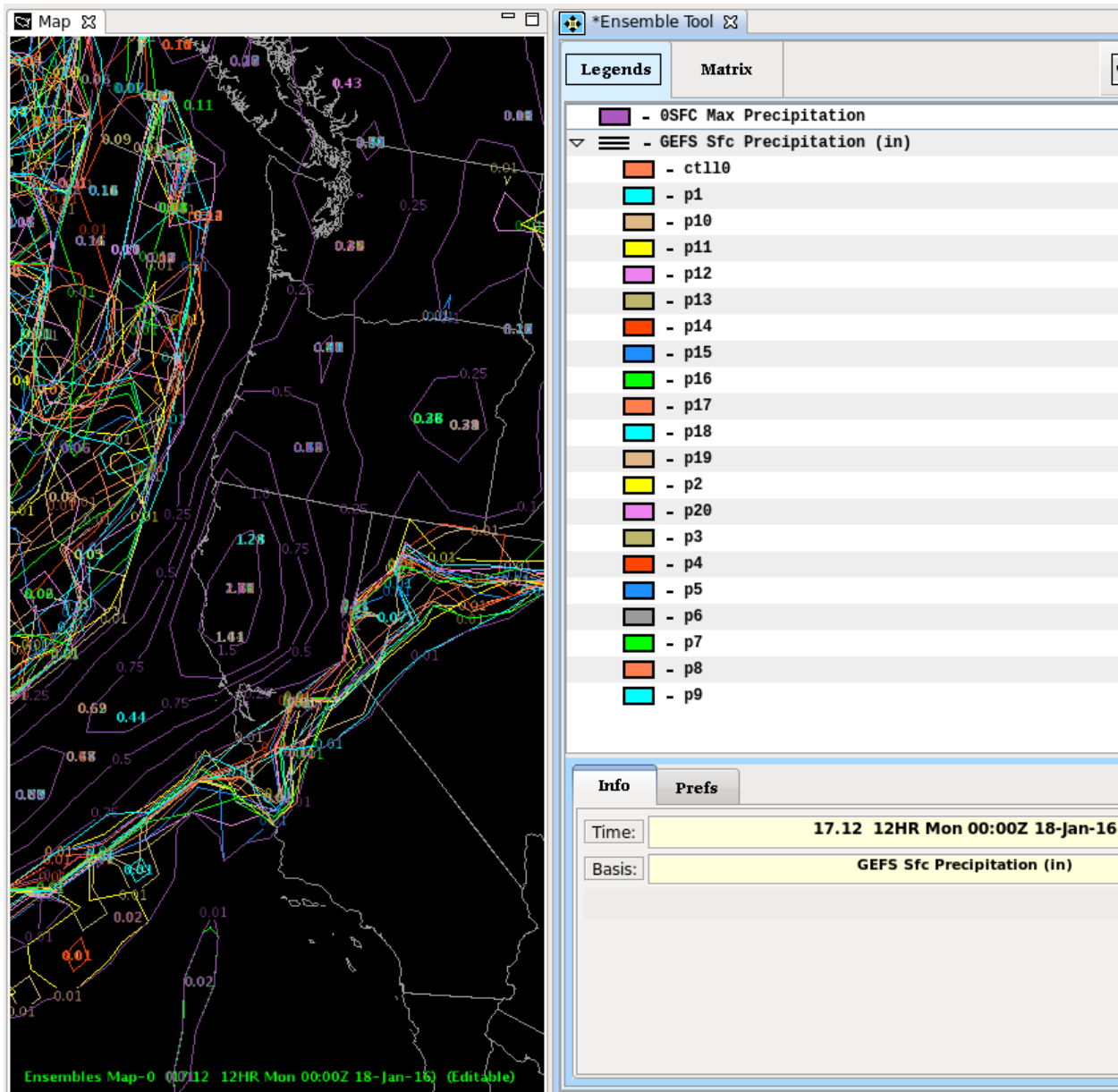


- Click on the **Map editor** with the precipitation members loaded, and **step** through the sequence until you find a precipitation area. Then in the top-left part of the Ensemble Tool, click on the **horizontal triangle** to expand the members. You can toggle any members by clicking on the member name, but for now keep them all toggled on. Any calculations on the ensemble members will only be done for the members toggled on.

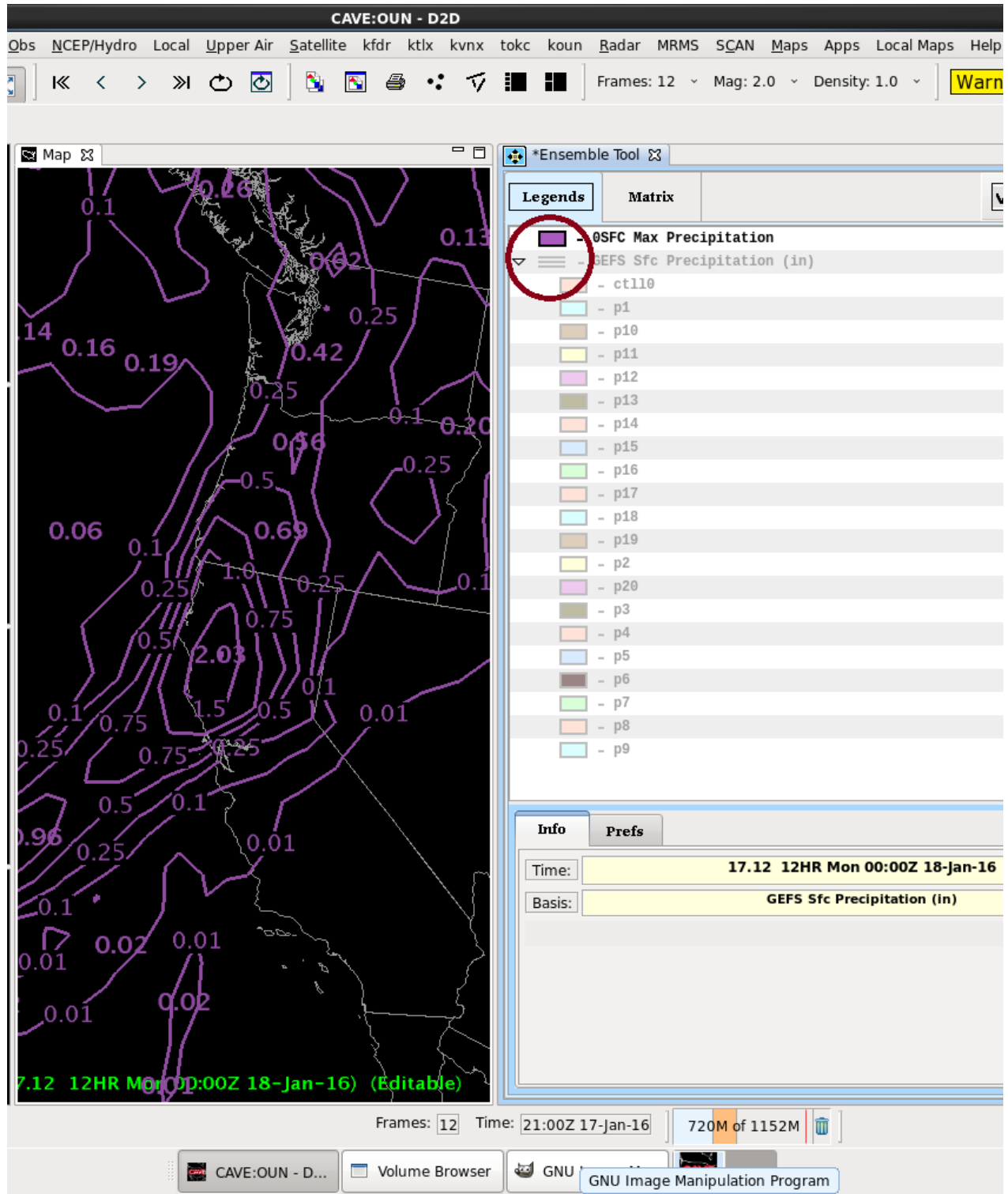


- Click on the **gear button** in the upper right part of the Ensemble Tool, and select **Max** to create a plot of max precip from all the members displayed.

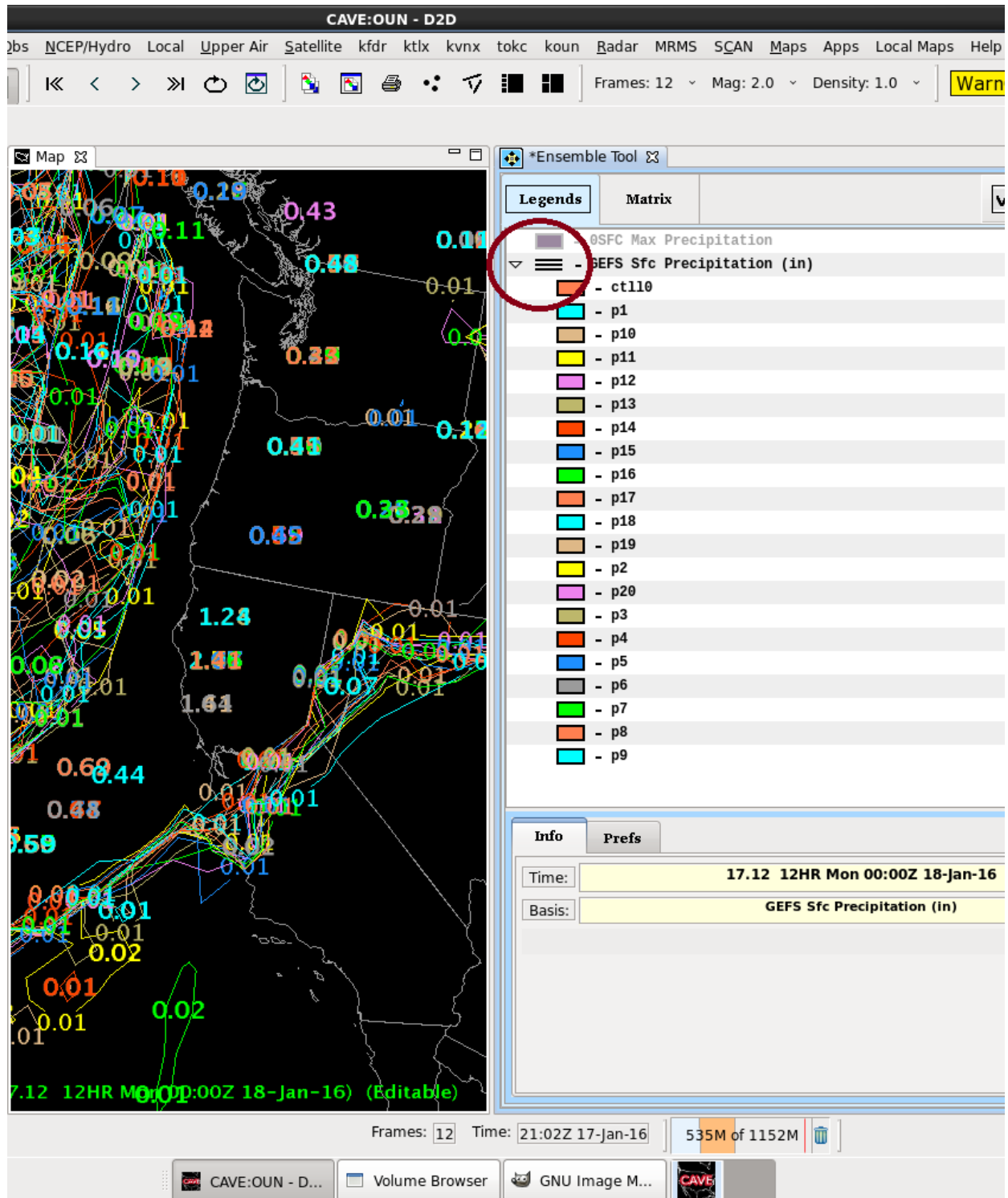




6. In the Ensemble Tool, click on the **three horizontal bars** to toggle off the members. You may want to right click on the Max Precipitation product row and change the color or line width or magnification).

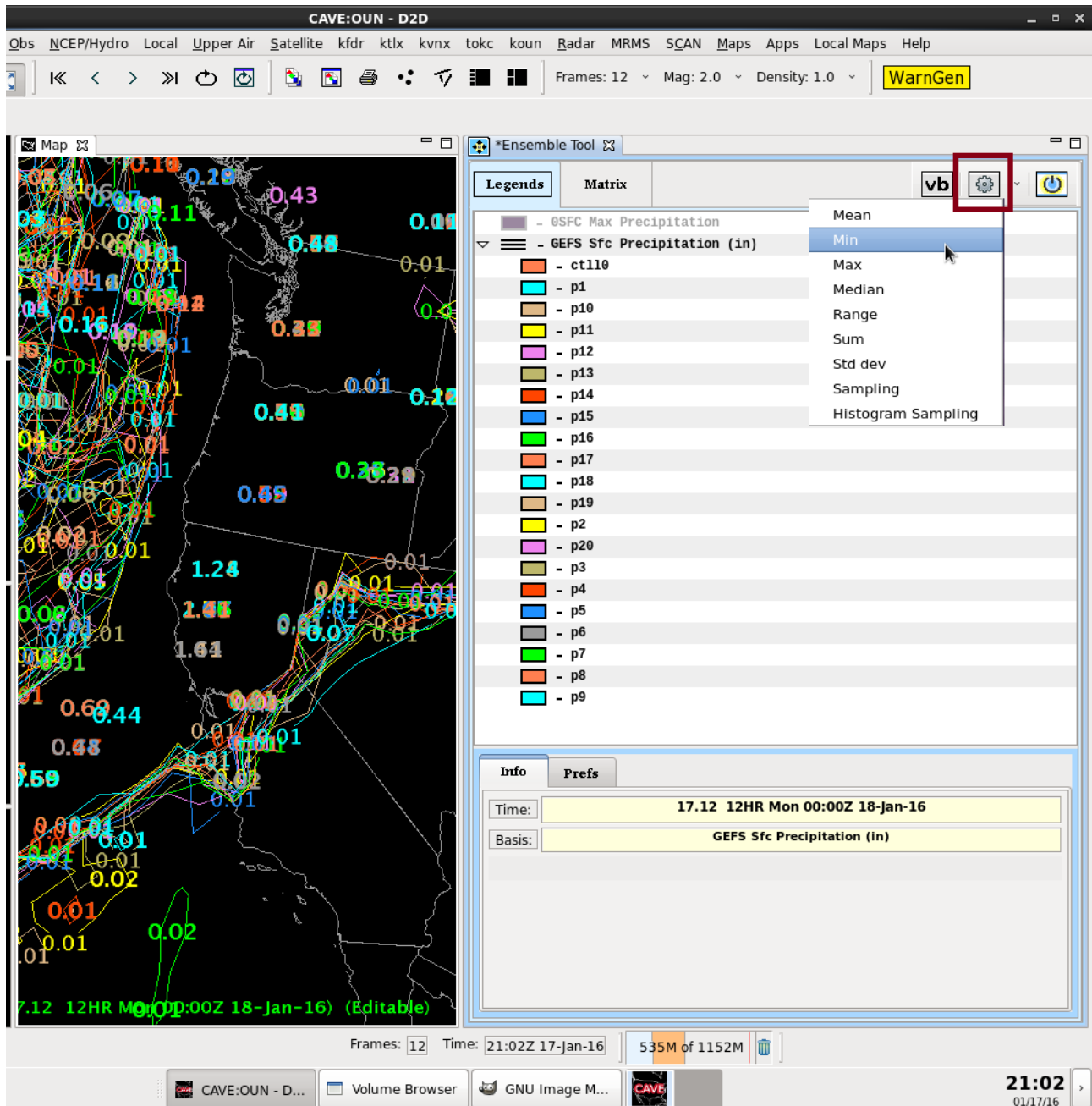


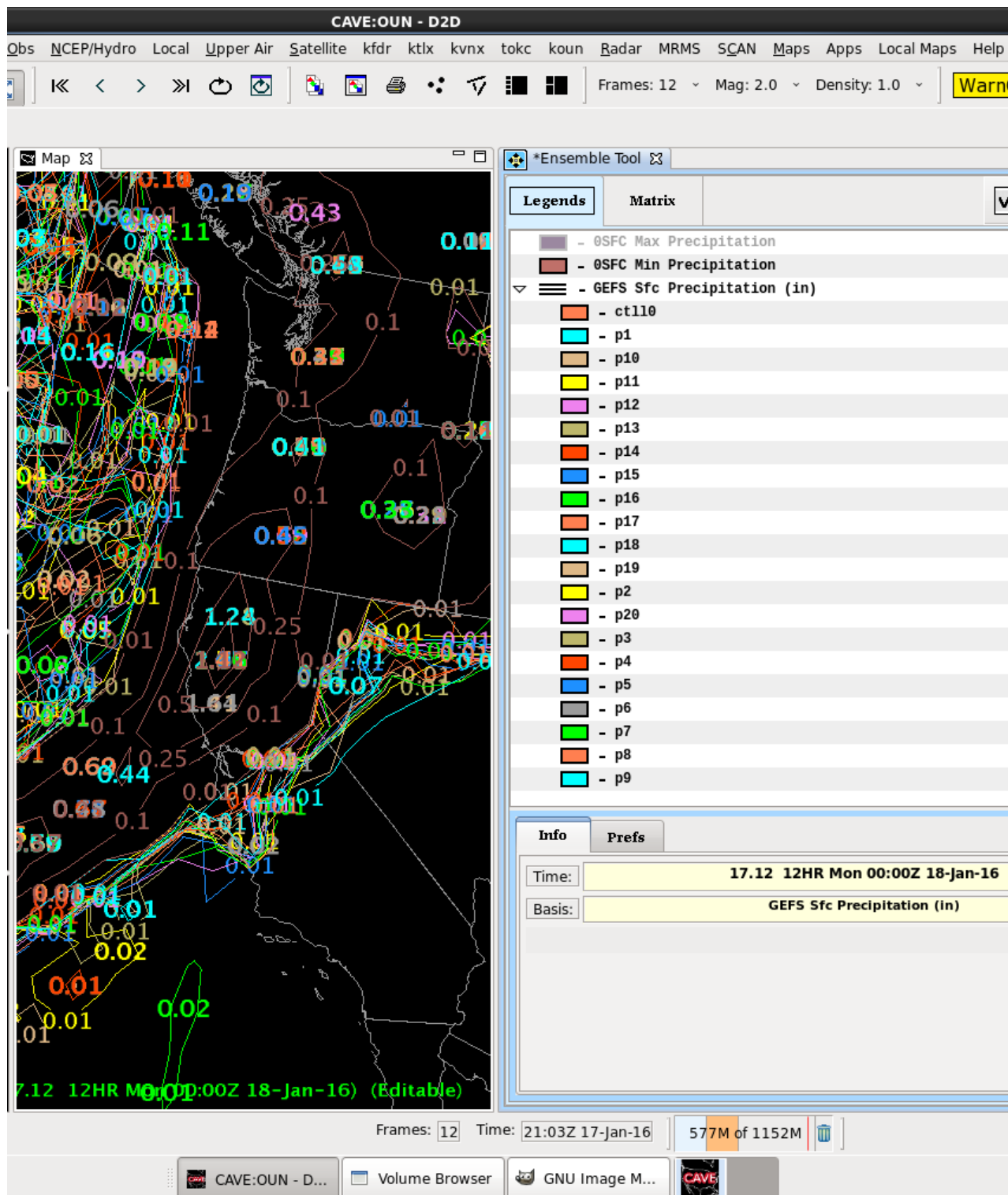
- Click on the **Max Precipitation** row to toggle off the max precipitation. Then click on the **3 horizontal lines** with the GEFS Sfc Precipitation to toggle on all the members.



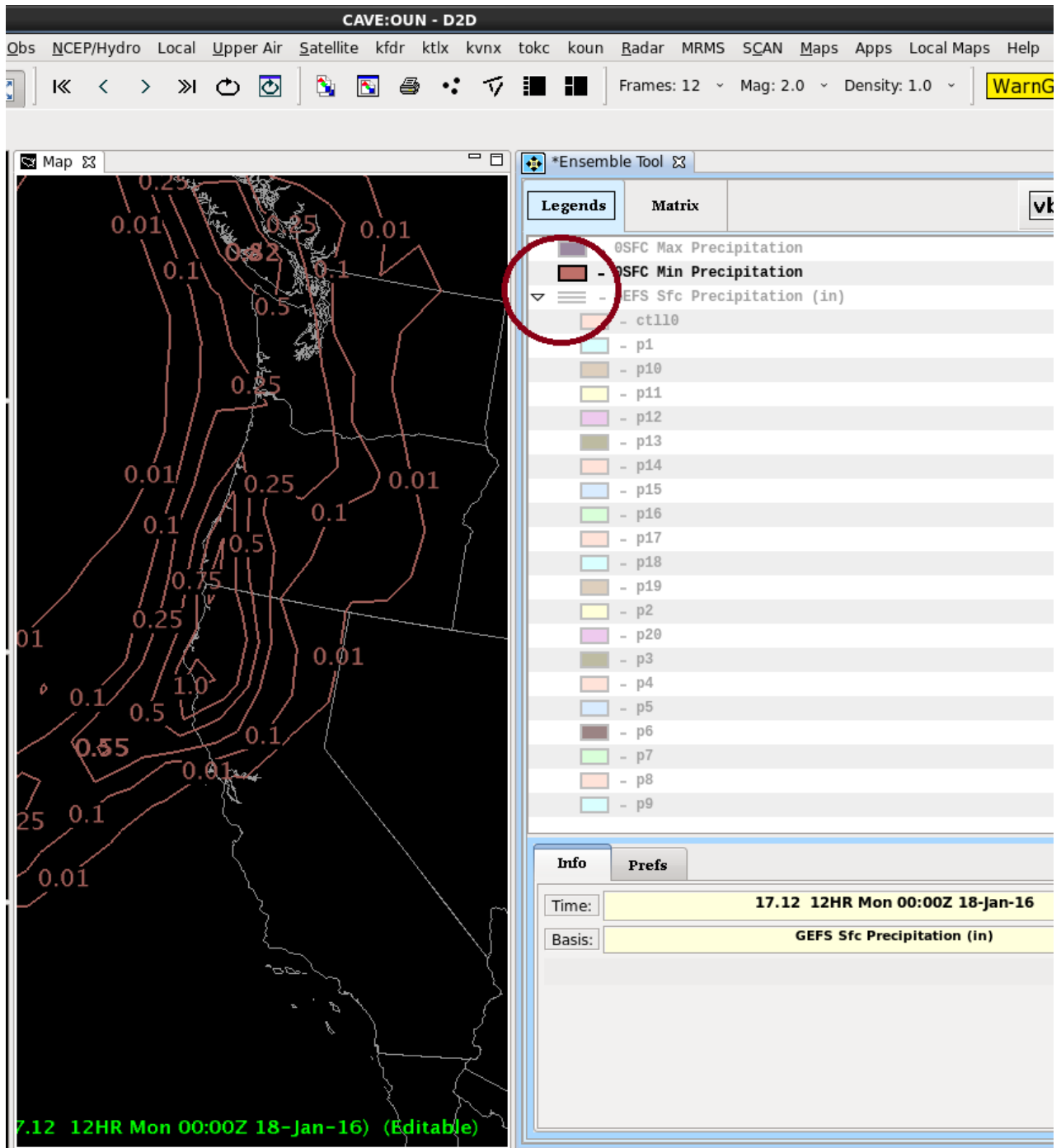


8. Click on the **gear box** and select **Min** to calculate the minimum precipitation from all members.

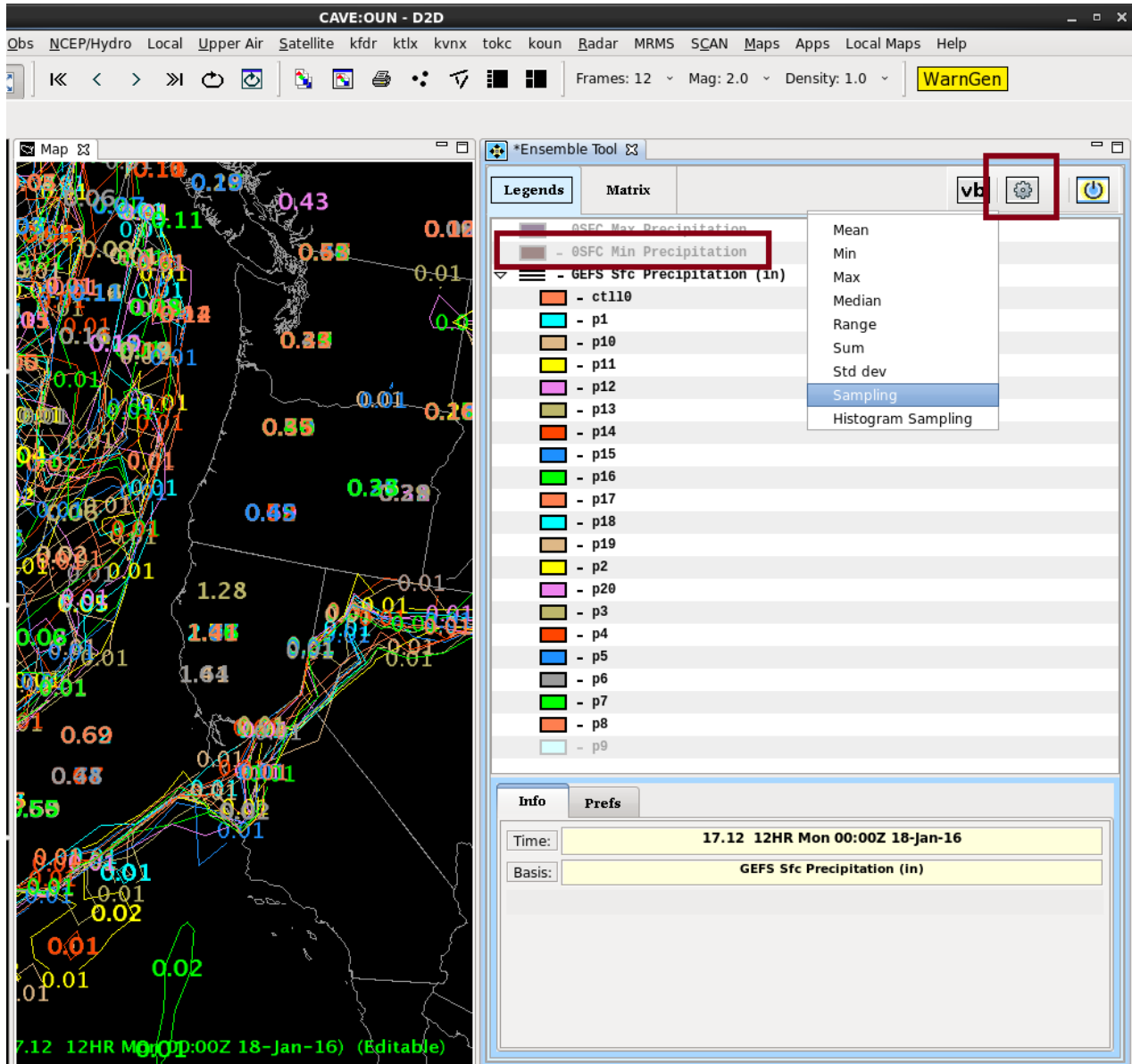




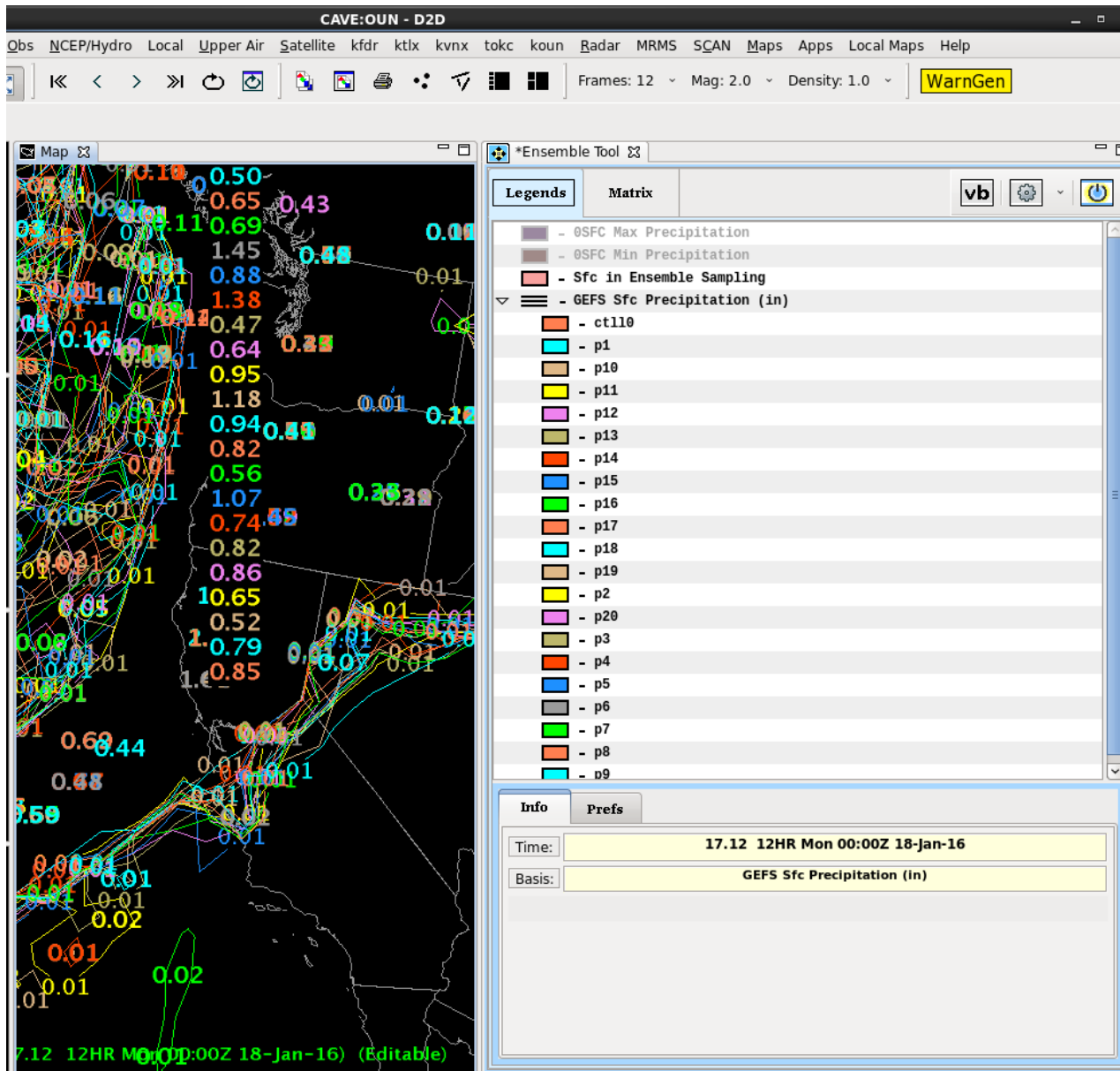
9. Click on the **three horizontal bars** to toggle off the members and see the result.



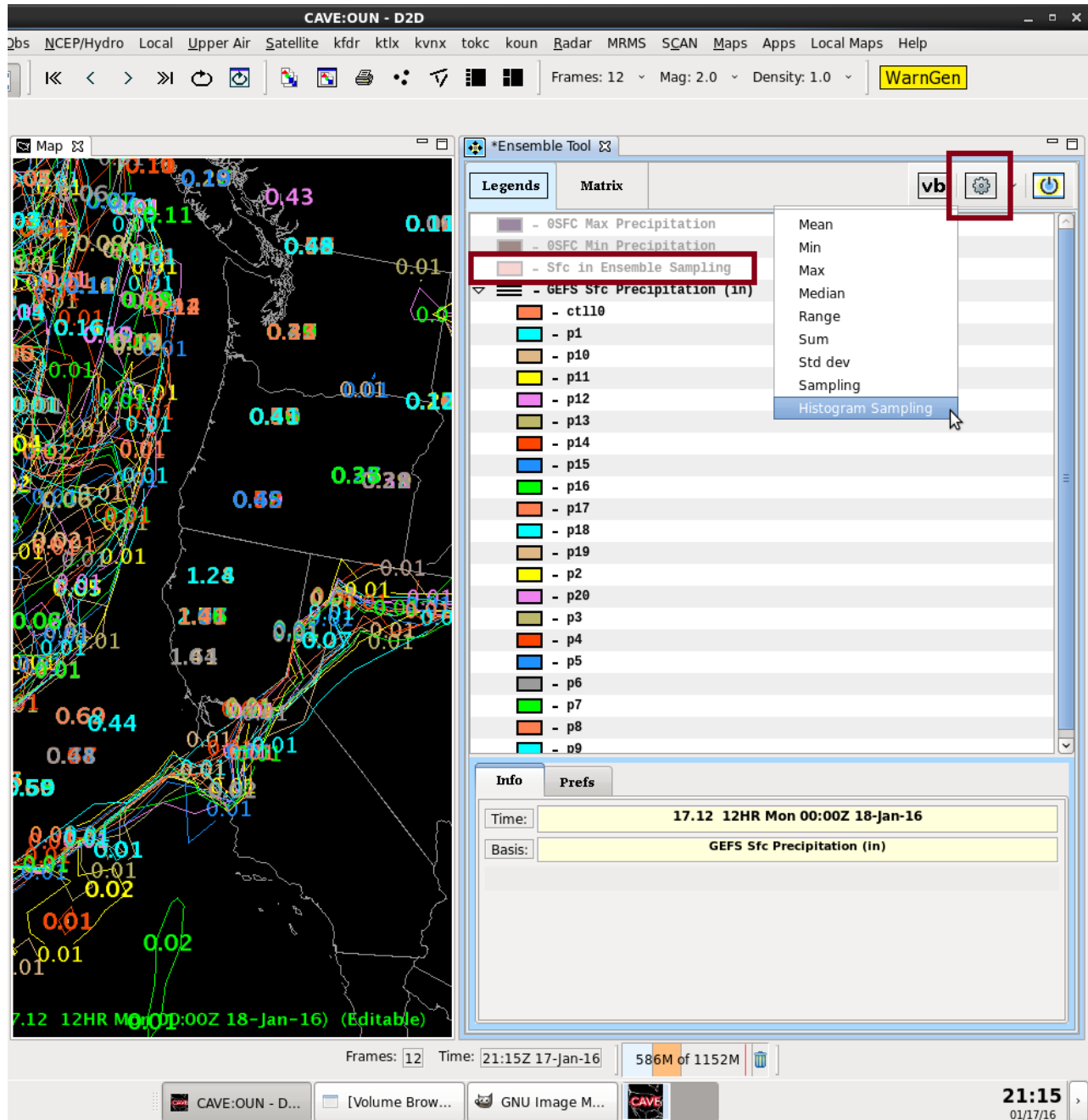
10. Click on the **Min Precipitation** product to toggle off that calculated field, and click on the **three horizontal bars** to toggle on all the members. Then click on the **gear box** and select **Sampling**.



11. Move your mouse cursor in the CAVE editor and **sample** out the values of the members.

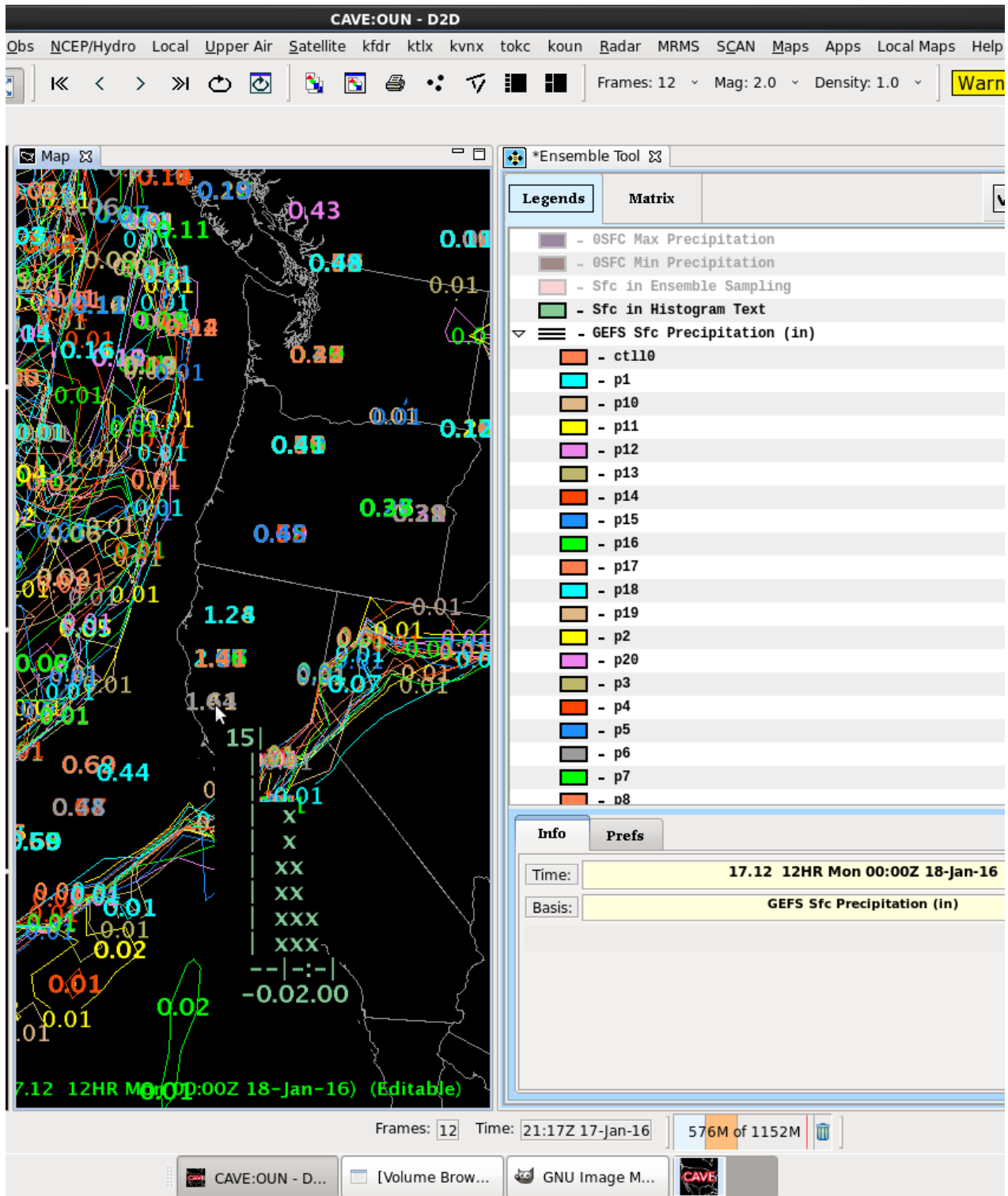


12. Toggle off the sampling calculation by clicking on the **Sfc in Ensemble Sampling** text in the Ensemble Tool. With the members displayed, click on the **gear icon** and select **Histogram Sampling**.



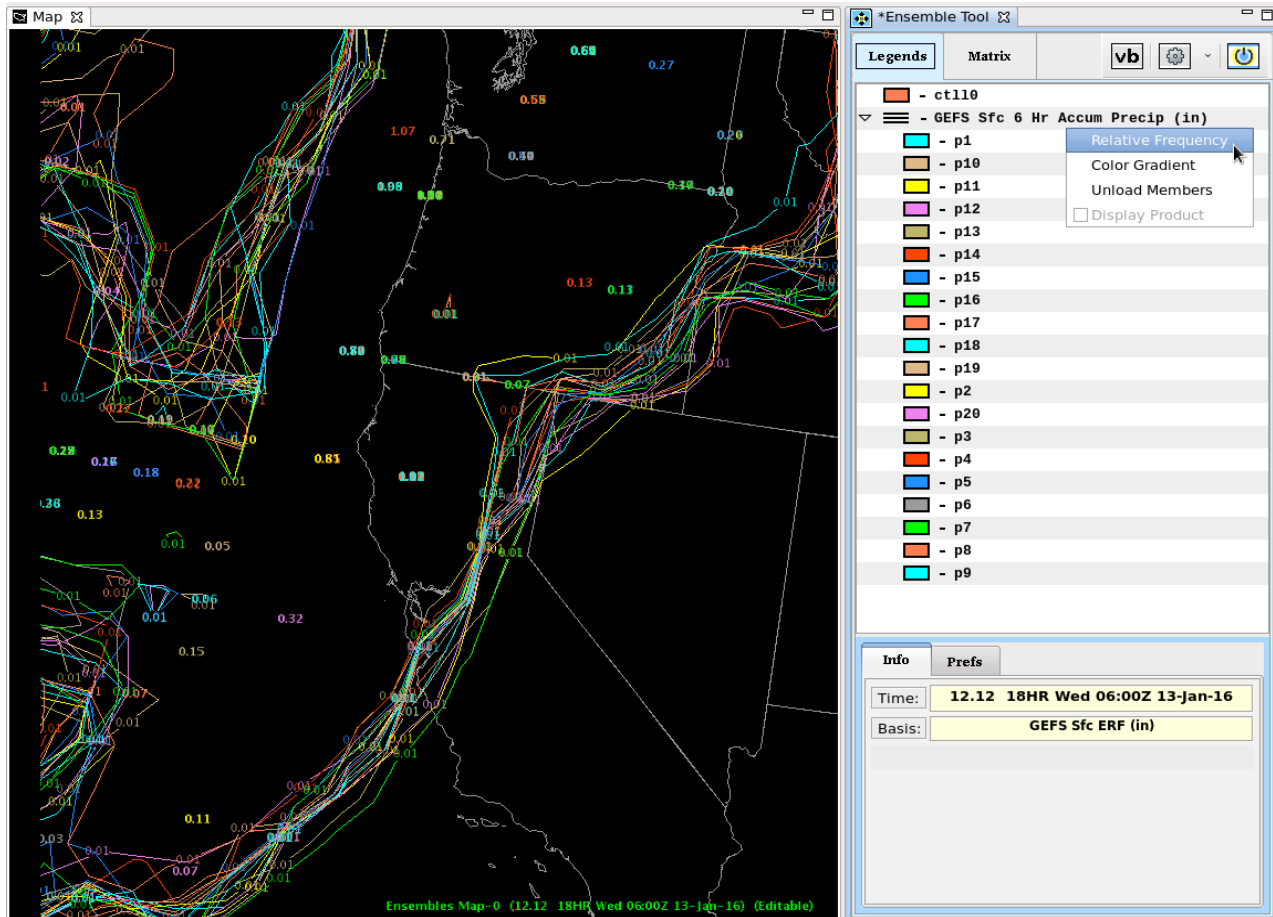


13. Move your mouse cursor in the CAVE editor to **sample** out the values in a histogram format.



Note the histogram clusters the members in groups vertically that correspond to the small scale on the X-axis. The peak QPF is around 2" and the taller stack of x indicates the more common values.

14. Right click on the **GEFS product legend** next to the horizontal bars and select **Relative Frequency**.



15. In the Ensemble Relative Frequency (ERF) Product Constraints popup, **select the checkbox** for the row you want to use and **enter a threshold** to calculate the relative frequency for (e.g.  $P(x)$ :  $x > 0.2$  is the probability that precip is greater than 0.2"). Click on the **Compute ERF** button.

The screenshot shows the 'ERF Product Constraints' dialog box. It has a title bar with a close button. Inside, there's a section titled 'GEFS Sfc 6 Hr Accum Precip (in)'. Below this, there are four radio button options for different probability constraints:
 

- ☐  $P(x)$ :  <  $x$  <
- ☐  $P(x)$ :  >  $x$  >
- ☒  $P(x)$ :  $x$  >
- ☐  $P(x)$ :  $x$  <

 At the bottom, there are two buttons: 'Compute ERF' and 'Cancel'. A mouse cursor is pointing at the 'Compute ERF' button.



16. **Analyze** the result. The relative frequency in the GEFS ensembles of the threshold you specified will display as a decimal fraction (e.g. 0.75 for 75 percent; note temperature plots display as whole numbers like 75). For instance in the center of the image below, 100% of the members contained precip accumulations greater than 0.2". Beware of tight gradients as displayed in the image below which may represent a lack of diversity of model solutions in the GFS.

